

Work Order ID 136981

Wednesday, September 23, 2015 10:17:23 A

136981

U/R

Page 1

Item ID: D412-664-443TRN

Accept

N900040100

Setup Start ***NS1***

Revision ID:

Item Name: Crosstube Turning Detail

Stop ***NS2***

Start Date: 9/23/2015 Start Qty: 1.00 ***1***

Cust Item ID:

Required Date: 9/23/2015 Req'd Qty: 1.00 ***1***

Customer:

Reference:

Approvals: Process Plan: MLS Date: SEP 23 2015 Tooling: _____ Date: _____
QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Run Start ***NR1***
Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
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Draw Nbr	Revision Nbr
D412-664-443	REV A U/R OK

CP 15/9/23

100 0.01

100

MORI SEIKI CNC LATHE LARGE

Mori Seiki

Memo

0.04

Mori Seiki CNC Lathe Large

1-Cut tube on chop saw, leave extra mat'l for facing.
2-Face tube to length.

1 φ
mm 2
15/11/26

110

QC1- Inspection performed by CMM

0.00

110

QC

Memo

0.00

Quality Control

1 φ
mm 2
15/11/27

DQA: _____ Date: _____



WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: _____ Date: _____

Work Order update only ☐

Work Order: _____ Part No. _____ NCR No. _____	DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐ Suspected Unapproved ☐	AGAINST DEPARTMENT/PROCESS Skid-tube ☐ Machining ☐ Thermoforming ☐ Large Fab ☐ Cross tube ☐ Small Fab ☐ Finishing ☐ Composite ☐ Water Jet ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Supplier ☐ Engineering ☐ Quality ☐ Other ☐			
Date :	Step #:	QTY Effective :		MRB (QSI042) Approval	
Description Work Order Deviation			Disposition		
			Completed By		
			Lead hand / Supervisor Approval Verification		
			QC / QA Coordinator Approval		
Root Cause		FAULT CATEGORY			
Environment ☐ Design ☐ Doc/Data ☐ Equip/Tooling ☐ Handling/Pre ☐ Material ☐ Internal Transport ☐ Tribal Knowledge ☐ LOA ☐ Substation ☐ Past Expiry Date ☐ Misidentified ☐	No Re-verification ☐ Operator ☐ Offset/Setup ☐ Supplier ☐ Training ☐ Use for Testing ☐ Poor Information ☐ Rushing ☐ Product Improvement ☐ Process Improvement ☐ Manufacturing Process ☐ Past Due ☐	Pressure/Forced ☐ Bending ☐ Centre Not Concentric ☐ Cracks ☐ Crimp/Kink/Ripple/Wave ☐ Cuffs ☐ Crushing ☐ Heat Treat ☐ Wave/Twist in Tube ☐ Marks/Chatter ☐	Temperature/Cure ☐ Set-up ☐ BOM/Route ☐ Broken/Damage/Defect ☐ Inspection Incomplete/Unqualified ☐ Contamination ☐ Countersink ☐ Cut Too Short ☐ Instructions Incomplete/Unclear ☐ Drill Holes ☐	Power Loss/Surge ☐ Folio/Program ☐ Grain ☐ Weld ☐ Wrong Stock Pulled ☐ Out of Sequence ☐ Off-set ☐ Mislabeled ☐ Fit/Function ☐ Misaligned/off center ☐	Positioned Wrong ☐ Outside Dimensions ☐ Over/Under tolerance ☐ Part Incorrect ☐ Part Lost/Missing ☐ Part Moved ☐ Drawing ☐ Finish ☐ Misread ☐ Turning Sequence ☐
OTHER : ☐					

Work Order ID 136981***136981***

Page 2

Wednesday, September 23, 2015 10:17:23 A

Item ID: D412-664-443TRN

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N900040100Setup Start ***NS1***

Revision ID:

Stop ***NS2***

Item Name: Crosstube Turning Detail

Start Date: 9/23/2015 Start Qty: 1.00 ***1***

Cust Item ID:

Required Date: 9/23/2015 Req'd Qty: 1.00 ***1***

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Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start ***NR1***

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

120

0.00

120

MORI SEIKI CNC LATHE LARGE

Mori Seiki

Memo

0.06

Mori Seiki CNC Lathe Large

1-Fill tube with sand & install plugs on both ends
2-Turn as per Folio FB216
3- File transition lines smooth.
4-Scribe part # as per Dwg D412-664-443
FOLIO REV: A
DWG REV: A

1 ~~Ø~~ mm
15/11/27

130

QC1- Inspection performed by CMM

0.00

130

QC

Memo

0.00

Quality Control

1 ~~Ø~~ mm
15/11/30

140

QC8- Inspect parts - second check

0.00

140

QC

Memo

0.00

Quality Control

1 ~~Ø~~ mm
DAS
47
9-89
15-12-07

DQA: _____ Date: _____



WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: _____ Date: _____

Work Order update only ☐

Work Order: _____ Part No. _____ NCR No. _____		DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐ Suspected Unapproved ☐		AGAINST DEPARTMENT/PROCESS <table style="width:100%; border: none;"> <tr> <td style="width:15%;">Skid-tube ☐</td> <td style="width:15%;">Cross tube ☐</td> <td style="width:15%;">Water Jet ☐</td> <td style="width:15%;">Engineering ☐</td> </tr> <tr> <td>Machining ☐</td> <td>Small Fab ☐</td> <td>Prod. Eng. Coord. ☐</td> <td>Quality ☐</td> </tr> <tr> <td>Thermoforming ☐</td> <td>Finishing ☐</td> <td>Rec/Store/Packaging ☐</td> <td>Other ☐</td> </tr> <tr> <td>Large Fab ☐</td> <td>Composite ☐</td> <td>Supplier ☐</td> <td></td> </tr> </table>						Skid-tube ☐	Cross tube ☐	Water Jet ☐	Engineering ☐	Machining ☐	Small Fab ☐	Prod. Eng. Coord. ☐	Quality ☐	Thermoforming ☐	Finishing ☐	Rec/Store/Packaging ☐	Other ☐	Large Fab ☐	Composite ☐	Supplier ☐	
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Past Expiry Date ☐	Manufacturing Process ☐	OTHER :																							
Misidentified ☐	Past Due ☐																								

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Page 3

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Accept

N900040100Setup Start ***NS1***

Revision ID:

Item Name: Crosstube Turning Detail

Stop ***NS2***

Start Date: 9/23/2015 Start Qty: 1.00

1

Cust Item ID:

Required Date: 9/23/2015 Req'd Qty: 1.00

1

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Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start ***NR1***

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Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
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150

150

Crosstubes

Large Fab

0.00

Memo

0.02

Crosstubes

Grind machining marks smooth longitude way.

JW 15-12-16

180

180

QC

Quality Control

QC5- Inspect part completeness to step on W/O

0.00

Memo

0.00

Q 15-12-16 PD.

190

190

Packaging

Packaging

Identify as per dwg & Stock Location: LG03

0.00

Packaging

Memo

0.00

LOCATION : LG014

JW 15-12-16

DQA: _____ Date: _____



WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: _____ Date: _____

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Work Order: _____ Part No. _____ NCR No. _____	DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐ Suspected Unapproved ☐	AGAINST DEPARTMENT/PROCESS Skid-tube ☐ Machining ☐ Thermoforming ☐ Large Fab ☐ Cross tube ☐ Small Fab ☐ Finishing ☐ Composite ☐ Water Jet ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Supplier ☐ Engineering ☐ Quality ☐ Other ☐			
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Work Order ID 136981***136981***

Page 4

Wednesday, September 23, 2015 10:17:23 A

Item ID: D412-664-443TRN

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N900040100Setup Start ***NS1***

Revision ID:

Item Name: Crosstube Turning Detail

Stop ***NS2***

Start Date: 9/23/2015 Start Qty: 1.00

1

Cust Item ID:

Required Date: 9/23/2015 Req'd Qty: 1.00

1

Customer:

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Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start ***NR1***

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
200	QC21- Final Inspection - Work Order Release	0.00							
200									
QC	Memo	0.00							
Quality Control									

MLJ DEC 16 2015*MLJ* DEC 16 2015

DQA: _____ Date: _____



WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: _____ Date: _____

Work Order update only ☐

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Picklist Print

Wednesday, September 23, 2015 10:17:27 AM

Page 1

Work Order ID: 136981

136981

Parent Item: D412-664-443TRN

D412-664-443TRN

Parent Item Name: Crosstube Turning Detail

Start Date: 9/23/2015

Required Date: 9/23/2015

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP REV:A NEW ISSUE 13-09-26 JLM VERIFIED BY:DD

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
D6020-160		Manufactured	No				Each	15.0000		1			

D6020-160

Crosstube Material

Location

Loc Qty

Loc Code

HALL

3

126259

3

SHED

12

126259

12

1 mark 15/11/25

DQA: _____ Date: _____



WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: _____ Date: _____

Work Order update only ☐

Work Order: _____ Part No. _____ NCR No. _____		DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐ Suspected Unapproved ☐		AGAINST DEPARTMENT/PROCESS Skid-tube ☐ Machining ☐ Thermoforming ☐ Large Fab ☐ Cross tube ☐ Small Fab ☐ Finishing ☐ Composite ☐ Water Jet ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Supplier ☐ Engineering ☐ Quality ☐ Other ☐					
Date :		Step #:		QTY Effective :			MRB (QS1042) Approval		
Description Work Order Deviation				Disposition				Completed By	
								Lead hand / Supervisor Approval Verification	
								QC / QA Coordinator Approval	
Root Cause		FAULT CATEGORY							
Environment ☐	No Re-verification ☐	Pressure/Forced ☐	Temperature/Cure ☐	Power Loss/Surge ☐	Positioned Wrong ☐				
Design ☐	Operator ☐	Bending ☐	Set-up ☐	Folio/Program ☐	Outside Dimensions ☐				
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Past Expiry Date ☐	Manufacturing Process ☐	OTHER : _____							
Misidentified ☐	Past Due ☐								

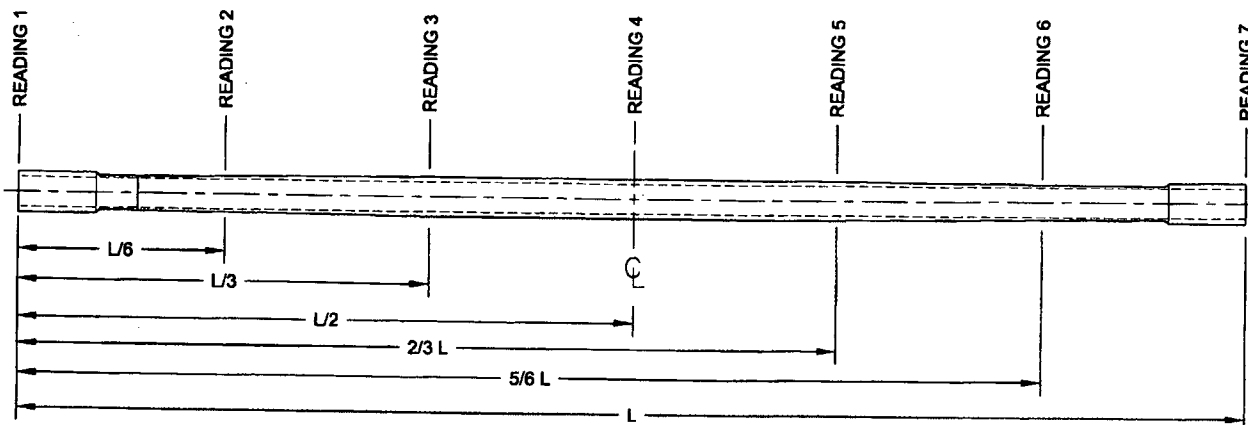
DART AEROSPACE LTD	Work Order: 136981
Description: Crosstube Assembly (412 High Aft SS)	Part Number: D412-664-443
Inspection Dwg: D412-664-443 Rev: A	Page 1 of 2

FIRST ARTICLE INSPECTION CHECKLIST

	Inspection Sheet Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	2.776	+0.005/-0.000	2.779	/		vern	CNC-08
	2.776	+0.005/-0.000	2.778	-			
	2.880	+0.005/-0.000	2.884	-			
	2.990	+0.005/-0.000	2.993	-			
	3.100	+0.005/-0.000	3.103	-			
	3.250	+0.005/-0.000	3.254	-			
	7.980	+/-0.060	8.00	/		vern	CNC-08
	0.063	+/-0.010	.063	-		RG	
	0.500	+/-0.010	.500	-		"	
	2.990	+0.005/-0.000	2.994	-		vern	CNC-08
SIDE B	2.776	+0.005/-0.000	2.780	/		vern	CNC-08
	2.776	+0.005/-0.000	2.778	/			
	2.880	+0.005/-0.000	2.885	/			
	2.990	+0.005/-0.000	2.994	/			
	3.100	+0.005/-0.000	3.104	/			
	3.250	+0.005/-0.000	3.253	/			
	7.98	+/-0.060	8.00	/		vern	CNC-08
	R0.06	+/-0.010	.063	/		RG	
	R0.50	+/-0.010	.500	/		"	
	Ø2.990	+0.005/-0.000	2.994	/		vern	CNC-08
	130.10	+/-0.060	130.10	/		tape	LG-11

DART AEROSPACE LTD		Work Order:	136981
Description: Crosstube Assembly (412 High Aft SS)		Part Number:	D412-664-443
Inspection Dwg: D412-664-443 Rev: A		Page 2 of 2	

WALL THICKNESS MEASUREMENT



Location	WALL THICKNESS MEASUREMENT (IN)				Deviation Δw (max-min)	TOLERANCE
	w1	w2	w3	w4		
READING 1 L= 0"	.313	.313	.320	.320	.007	0.073"
READING 2 L= 22	.205	.203	.212	.213	.010	
READING 3 L= 43	.322	.322	.323	.321	.002	
READING 4 L= 65	.446	.445	.445	.446	.001	
READING 5 L= 86	.330	.332	.326	.324	.008	
READING 6 L= 108	.210	.211	.207	.204	.007	
READING 7 L= 130	.317	.317	.316	.315	.002	

Calibration Result

Actual Block Thickness: .100 .306

SITESCAN 250 Measured Thickness: .100 .500

Measured by: gmm L		Audited by: DAS 47		Preliminary Approval:	
Date: 15/11/30		Date: 15-12-07		Date:	

Rev	Date	Change	Revised by	Approved
A	14.06.24	New Issue (P/O D412-664-403)	KJ	[Signature]

Item	Qty -443	Part Number	Description
1	X	D412-664-443	CROSSTUBE ASSEMBLY (412 HI AFT)
2	1	D6020-132	CROSSTUBE MATERIAL (132" MIN. LENGTH)
3	2	D3595-063-530	RUBBER CUSHION
4	1	D4909-1	SUPPORT
5	2	D4910-1	CHAFING SHIELD
7	4	MS21920-26	CLAMP
8	2	MS21920-28	CLAMP
9	A/R	SCOTCH-WELD DP460	EPOXY ADHESIVE, 3M SCOTCH-WELD
10	A/R	PROSEAL 890	SEALANT

GENERAL NOTES:

- 1) MATERIAL: MANUFACTURED FROM D6020-132
FINISHED LENGTH = 130.10±0.060 (BEFORE BENDING/TRIMMING)
- 2) FINISH: PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
MASK UNDERSIDE OF CROSSTUBE AS SHOWN (ZN C6-2, HATCHED AREA)
PAINT OUTSIDE PER DART QSI 005 4.2
AFTER PAINTING, REMOVE MASKING AND APPLY MATTE CLEAR COAT PER DART QSI 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: SCRIBE DART P/N "D412-664-443" AND B/N ON INSIDE OF CUFF PER DART QSI 044 6.4 (VIBRATING STYLUS)
- 7) WEIGHT: 90.2 lb AFTER MACHINING
86.7 lb FINISHED WEIGHT
- 8) PART IS SYMMETRIC ABOUT CENTERLINE.
- 9) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.

BENDING

- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 7% (BASED ON O.D.) IN LOWER HALF OF R35 BEND AND 6% (BASED ON O.D.) ON REMAINING TUBE.
- 11) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038. TO BE PERFORMED AFTER FINAL POST-BEND GRINDING. ANY ADDITIONAL GRINDING REQUIRES ANOTHER LPI INSPECTION.

ASSEMBLY

- 12) INSTALL D4909-1 CENTER SUPPORT USING A 0.04" TO 0.07" THICK LAYER OF SCOTCH-WELD DP460 PER QSI 015.
- 13) INSTALL MS21920-28 CLAMPS WITH D3595-063-530 RUBBER CUSHIONS TO SECURE THE D4909-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE ON TOP OF CROSSTUBE SUPPORT.
- 14) IF NOT ALREADY PRESENT ON CHAFING SHIELD, APPLY A THIN COAT OF PROSEAL 890 ON INSIDE CONCAVE SURFACE OF D4910-1 CHAFING SHIELD AND LET CURE PER MANUFACTURER'S INSTRUCTIONS. INSTALL PROSEAL D4910-1 CHAFING SHIELD ONTO CROSSTUBE BY APPLYING A THIN COAT OF PROSEAL 890 ONTO CROSSTUBE. BE SURE TO ELIMINATE ANY AIR GAPS.
- 15) TORQUE CLAMPS ON D4909-1 SUPPORT 80 TO 100 IN-LB. TORQUE CLAMPS ON D4910-1 CHAFING SHIELD 40 TO 50 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER ADHESIVES HAVE CURED FOR 24 HOURS.

136981 MCT
15-09-23

UNDER REVIEW

UP 15/14/28
LRF 15-561

UNDER REVIEW

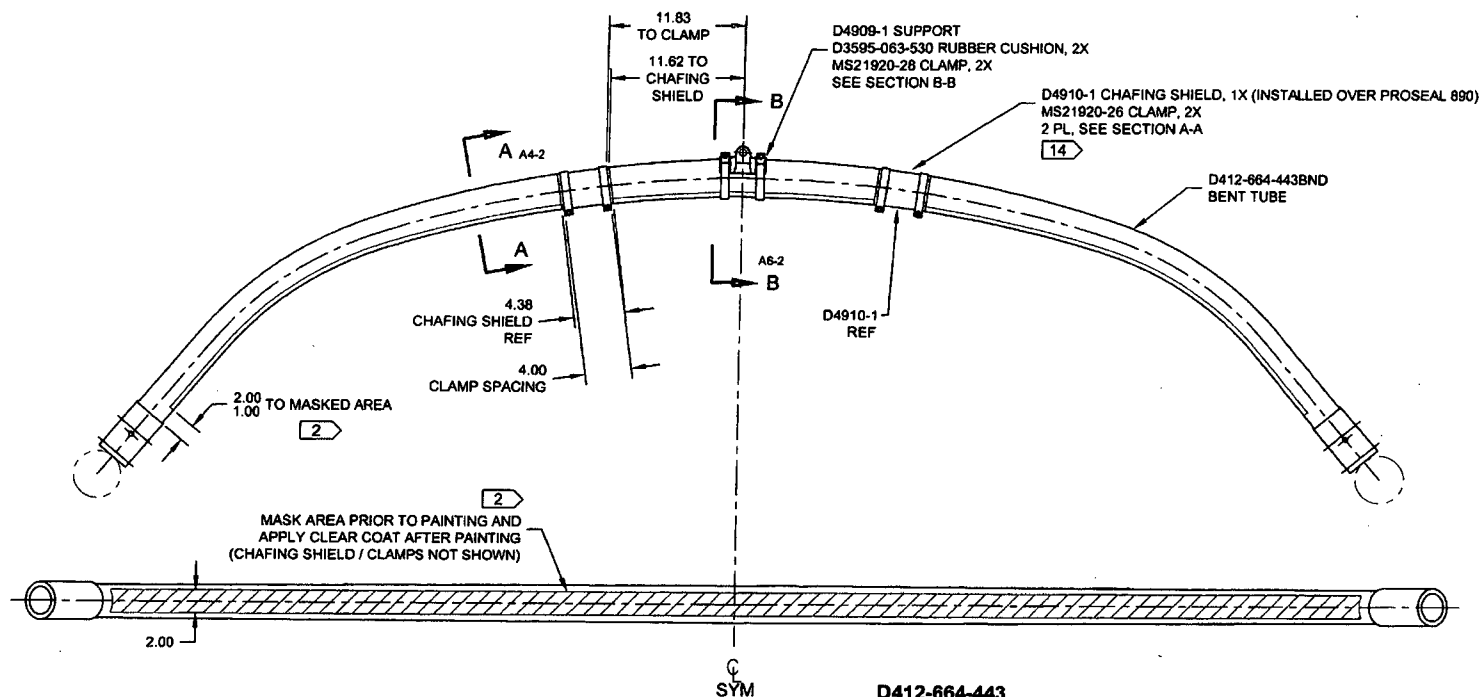
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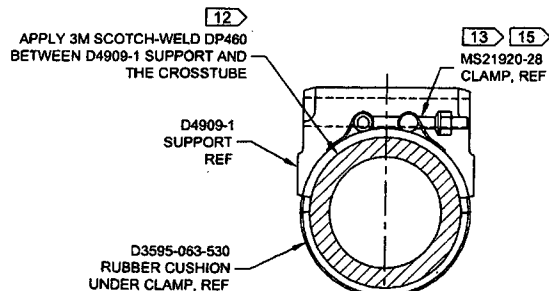
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DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
DRAWING NO. D412-664-443	REV. A SHEET 1 OF 4
TITLE CROSSTUBE ASSY (412 HI AFT)	SCALE NTS

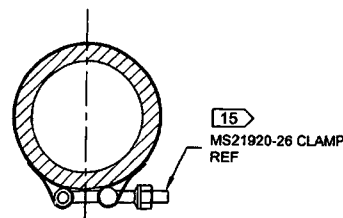
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D412-664-443
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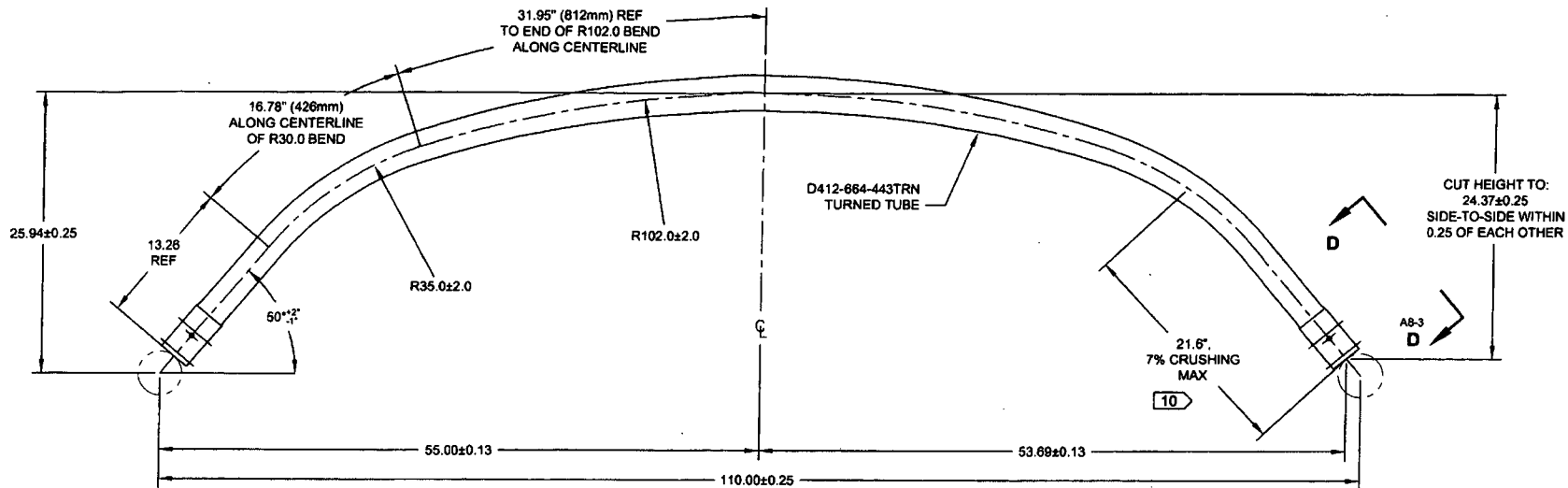
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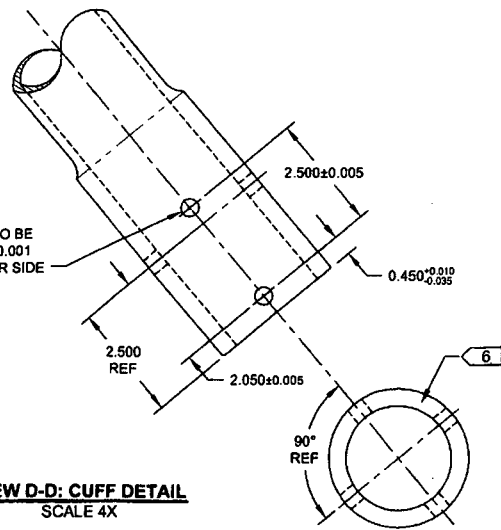
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BENDING DETAIL



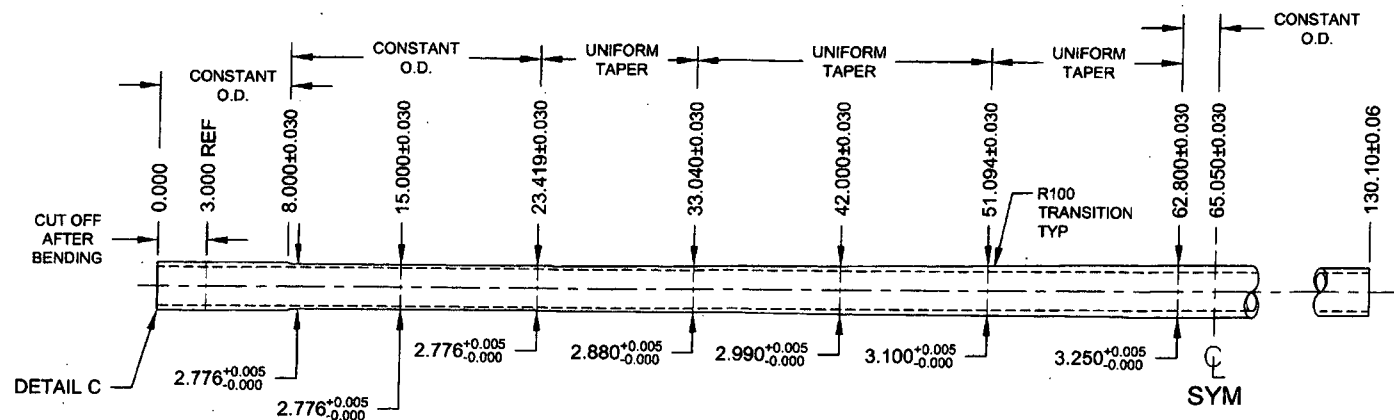
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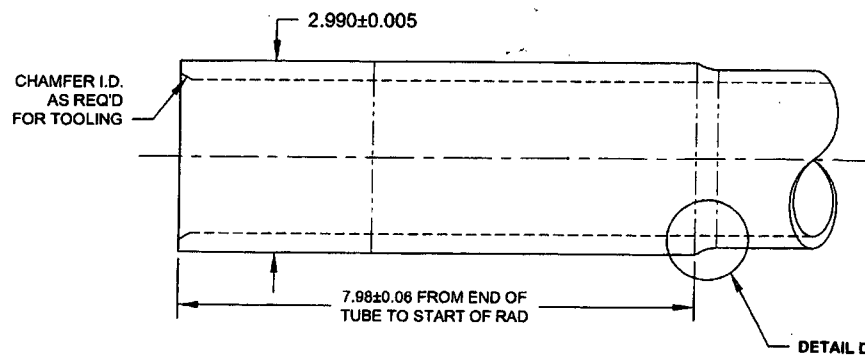
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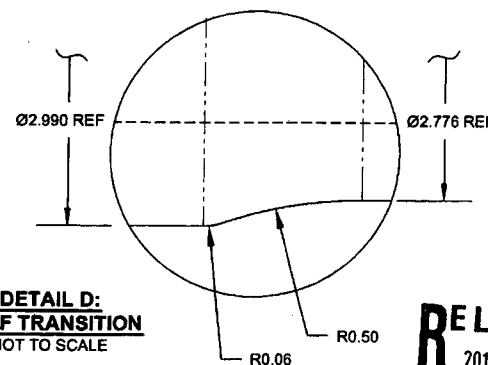
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TURNING DETAIL

UNDER REVIEW

15/14/28



DETAIL C:
CUFF TRANSITION
SCALE 4X



DETAIL D:
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